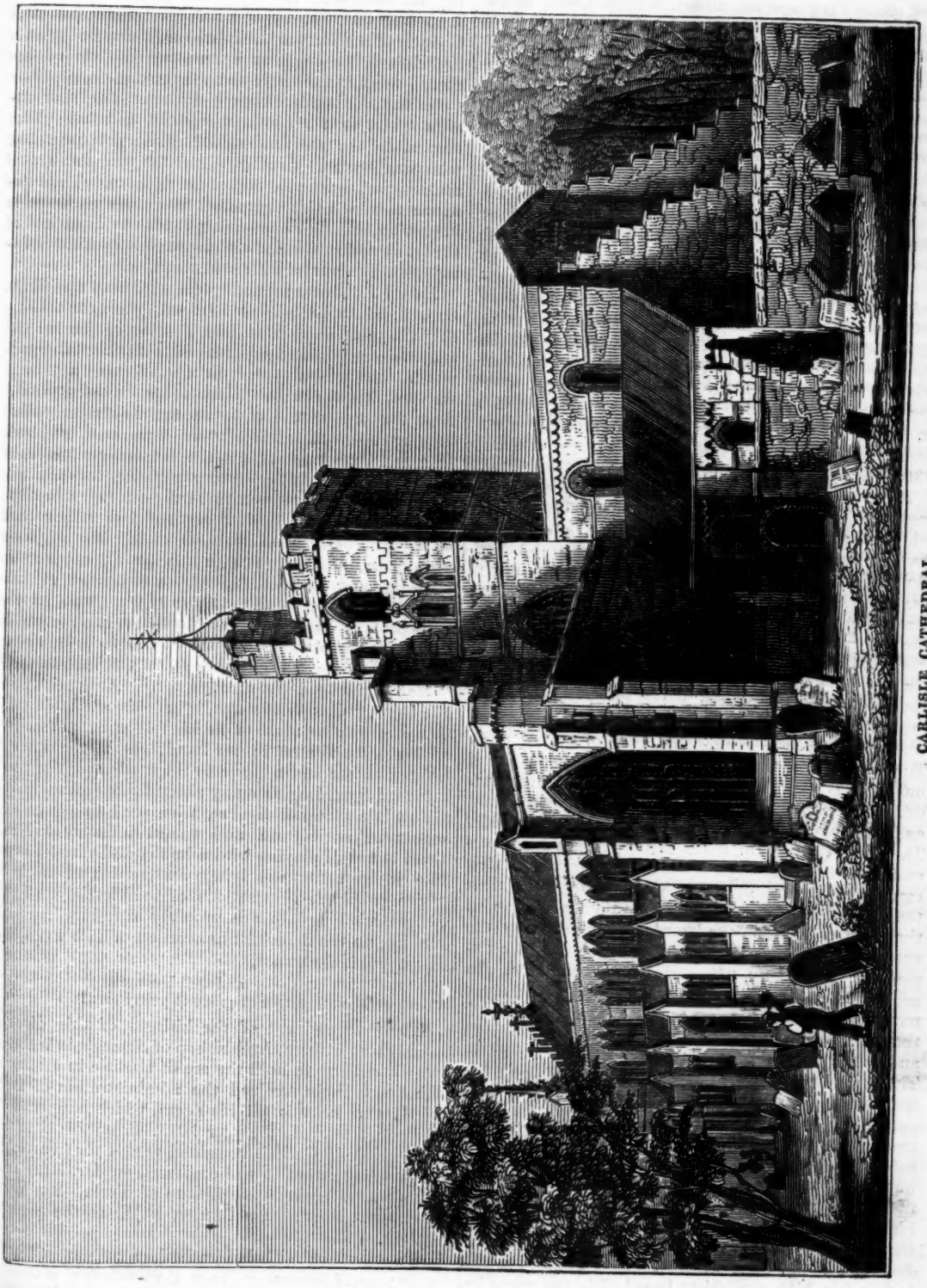
THE

Saturday Magazine.

No. 424. FEBRUARY 9TH, 1839. Price One Penny.



CARLISLE CATHEDRAL.

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TANNER gives the following account of the origin of the ecclesiastical establishment at Carlisle.

Several writers of St. Cuthbert's life, tell us of that holy man's founding here, A. D. 686, a Convent of monks, a School, and an Abbey of nuns; but from Bede's life of St. Cuthbert, it seems as if the monastery here to which Queen Ermenburga retired, was in being before St. Cuthbert's coming to Carlisle. But all these ecclesiastical buildings, with the city and adjacent country, being laid waste in the Danish wars, the city was rebuilt and fortified by King William Rufus: and Walter, a Norman priest, being made by that king governor of the city, began a monastery to the honour of the Virgin Mary: which was finished and endowed by King Henry the First, who placed regular canons therein, and when he had established the Bishop's see here, made this church a cathedral: but it is observable that this was the only episcopal chapter in England of the order of St. Austin.

King Henry the First, before the foundation of the bishoprick, was a benefactor to the priory; and Kings Henry the Third, and Edward the First, bestowed large possessions on the Bishop and Church. The first Bishop of Carlisle was Athelwold, who was consecrated in 1133, and died in 1156. The cathedral was built at various periods, and displays specimens of different styles of architecture. The length of the choir is 137 feet; its height 75; its breadth, together with the aisles, 71. The breadth of the transept is 28 feet; its length 124. The height of the square embattled tower in the centre, between the nave and transept from the area of the church, is about 130 feet.

Although this edifice is partly surrounded by buildings and trees, there are several points of view in which it may be seen to advantage. The cathedral was originally a complete cross-church, and had cloisters and a chapter-house. The greatest part of the cloisters, and a large portion of the nave, were destroyed in the civil wars; the two remaining aisles of the nave are fitted up as the parish-church of St. Mary. This part is Norman, of a simple and massive character; but the greatest portion, eastward, is early English, of elegant design, parts being much ornamented with foliage, &c. The east end is decorated, and seems to have replaced a front of earlier date. The transepts are narrow and short, and have no aisles, but there is a small chapel east of the south transept, dedicated to St. Catherine, which was founded and endowed by John de Capella, a citizen of Carlisle. The choir consists of seven arches, with a small one eastward, which spring from clustered piers with rich capitals; it has aisles, and is considerably wider than the nave. The choir was begun by Bishop Welton, in the reign of Edward the Third, and finished by the succeeding bishops, Appleby and Strickland, the expenses being chiefly defrayed by subscriptions. In arches, formed in the walls of the aisles, are some monumental effigies mitred, but the persons whom they represent are not known. The tower is small and low, and coincides with the centre of the nave. The early English clerestory windows have been filled with tracery of a later date, and there are a few perpendicular windows inserted in the aisles. The east front contains one of the finest, if not the finest, decorated window in the kingdom. It is much decayed, but its elegance of composition, delicacy of arrangement, and the harmony of its parts, rank it even higher than the celebrated west window of York Cathedral, which it also exceeds in the number of divisions, as it has nine lights. This window, which is fifty feet high and thirty broad, fills the space between two very bold buttresses, crowned with fine pinnacles which rise above the ridge of the roof. Over the great window, is a small one of rich tracery to light the roof.

The chapter-house and cloisters stood on the south side of the cathedral. Part of the dormitory is still remaining, as well as the refectory, which is now used as the chapter-house. The priory-gate is also standing, and in tolerable repair. It was built by Prior Senhous, in 1507. L. Salkeld was the last prior, the priory having been dissolved in 1540 by King Henry the Eighth, who, in its place, erected and incorporated a dean and chapter, by the name of the Dean and Chapter of the Holy and Undivided Trinity of Carlisle. Salkeld's initials appear upon several parts of the carved work in the choir of the cathedral.

On the north side of the choir, near the communion table, is a curious monumental brass plate, erected to the memory of Dr. HENRY ROBINSON, who was born at Carlisle, about the year 1556, and afterwards became Bishop of the diocese. The eminence to which this person attained from an humble beginning, supplies one among the many instances of the great rewards which are thrown open in this country to professional labour and merit.

Henry Robinson was educated at Queen's College, Oxford, where he was at first only "a poor serving child," but afterwards became Provost of the college, and conferred distinguished benefits on that establishment. He is designated on the tablet, as a "most watchful Bishop of this Church for eighteen years." Near the top of the plate an angel is represented, bearing a scroll, inscribed "Τοις Επισκόποις," "*To the Bishops.*" And above it is the following passage, in Latin, from St. Luke, having allusion to episcopal vigilance; "*And there were in the same country shepherds abiding in the field, keeping watch over their flock by night.*" The main features of his history, as a clergyman, which are here portrayed, appear so pleasing and honourable, that we cannot forbear describing them briefly. Over the *entrance* of the cathedral, as represented on the brass, are the words "Intravit per ostium," or "*He entered in by the door.*" On a label across the entrance is, "Permansit fidelis," "*He remained faithful unto the end.*" And below, on the steps, "Recessit beatus," "*He departed blessed.*" The bishop also appears in his full episcopal dress, with a pastoral staff in one hand, and in the other a lighted candle and a cord: to the cord three dogs are attached, guarding as many sheep-folds from wolves. Below is a group of figures, who are holding implements of agriculture and useful industry. Near them is a wolf playing with a lamb; and various warlike instruments are lying scattered and broken. These prophetic illustrations of the blessings of the MESSIAH'S kingdom are properly introduced, as attending on the faithful ministration of His word, by His appointed servant,

> and well become
> The messenger of grace to guilty men!

The most eminent of the bishops of this diocese was JAMES USHER, Archbishop of Armagh, in Ireland, who had leave to hold the see of Carlisle in addition. He accordingly received the administration of it in 1641, and held it till his death, which happened at Reigate, Surrey, in the year 1655. From this time the bishoprick of Carlisle remained vacant for five years. At the restoration it was conferred on Dr. RICHARD STERNE, afterwards archbishop of York. The Hon. and Right Rev. HUGH PERCY, D.D., is the present bishop.

To the cathedral belong a Bishop, a Dean, a Chancellor, an Archdeacon, four Prebendaries, a theological lecturer, five Minor Canons, four lay clerks, six choristers, and six almsmen.

FRUITS DESIGNED TO BE A SOURCE OF ENJOYMENT TO MAN.

No. II.

THE apple furnishes a familiar model for another class of fruits, though the variety under it is very limited. If this structure should be considered as a mere protection for the seeds, it would be a very superfluous one; and the real intention is not less visible. In the case of the cashew, externally resembling the apple, if botanically differing, the fruit is an absolute superfluity; since it does not even enclose the otherwise fully-protected seed. If the cellular structure of these fruits checks fermentation, as in the former cases, while conferring an almost incredible firmness, when the small proportion of solid matter is considered, there is a further provision, for the preservation of the apple at least, through that exudation, too often carelessly removed, which, by forming a varnish, excludes one of the most active causes of destruction. The strength and compactness of the very thin, yet secure epidermis by which these fruits are protected, ought also not to pass unnoticed.

The cherry and the peach are examples under that class of fruits which botany terms a Drupa. Here, the superfluity is very striking, because the seed is completely protected by the stone. For all purposes to this essential part, every drupa might have been a filbert, or at least a walnut, where the external covering is not a fruit. And here also we must admire that cellular structure through which the purposes already named are accomplished: while in the peach in particular, the firmness is exceedingly remarkable, when the actual quantity of fluid in the total bulk is considered. And it must not be forgotten that in every one of these instances, this often apparently impossible problem has been solved for purposes of utility: if also variously solved, as if to evince resource. A fluid was the thing to be produced; but that was to be rendered transportable and durable: and by means that almost appear magical, it has been made to assume the form of a hard and resisting solid.

The general principle of all the fruits which seem intended for gratification, is chemically simple and uniform. As far as mere taste is concerned, it consists in all, fundamentally, of a mixture of sugar and acid, differently proportioned, and more or less diluted. The orange alone will, at different stages of ripeness, illustrate these differences; as the red currant and the greengage plumb are, in our own fruits, examples of the opposed extremes. Speaking however with chemical rigidity, the sugar is not always that of the sugar-cane: in the fig and the date for example, it approaches in quality to manna. The acid portion appears to comprise many more acids than chemistry has yet ascertained: but it is familiar with at least the malic, oxalic, citric, and tartaric; while, as far as our experience goes, the two last appear to be the most general. The mucilage, constituting the only other general principle, seems only to modify the taste of these compounds; or, like water, may be considered as a diluent, otherwise at least than as it is a nutritive substance.

In the fig, this forms a very large ingredient: if it abounds in some grapes, it is nearly wanting in others, and in the orange the quantity is still more minute. This then is all: sugar, acid, mucilage, or jelly, and water: and as these variously prevail, we have all the range in quality in fruits from the thin acid currant, to that beautiful proportion which constitutes the grape, to the powerful mixture of sugar and acid in the pine-apple, and the almost total absence of the latter in the fig.

Even thus far we might fairly suppose an intention of beneficence, in the varieties of taste thus produced: as all the useful qualities might have existed under one variety, just as the nutritious properties might have excluded, not only variety, but taste itself. This, however, is far from all that has been done for our pleasure; since there yet remains to be noticed that most mysterious compound, or set of substances, forming the principle of flavour, of which chemistry can give no account; transcending as they do, and perhaps ever will, our power of analysis. Be they what they may, they have been ordained and provided; while their relations to the sense of taste, so as to produce pleasurable impressions, must be arbitrary, or solely dependent on the intention and command of the Creator.

We are not indeed sure that the whole of these peculiar provisions have been made for man alone. It would be indifferent as to the present argument, though other animals partook with us of these enjoyments; but the indifference and distaste which they show to the flavours and odours which we enjoy, with their frequent attachment to those which are disagreeable to us, point out, in those cases at least, that the beneficent appointment has been especially intended for man.

And it is through the principle of flavour that there has been produced a far greater range of variety in fruits, than any modification of their fundamental elements could have effected; while it is through this also that all that delicacy of quality which attracts us most in these productions, has been conferred. No power but the Highest could have created what it passes human imagination to conceive, as well as human knowledge to assign; and no wisdom but His could, through the addition of imponderable, inseparable, unintelligible, have wrought out such a variety of ends. Deprive the finest fruits of their flavour and they are nothing: sweet, sour, and mucilaginous. Such is often the result of our imperfect climate; and thus, even the peach falls beneath the apple. Without this, the cheremoya and the mangosteen would be nothing: as the pineapple might almost be represented by a mixture of our own making.

And has not all this superfluity, so varied, so constant, so delicate, so difficult to understand, been appointed for us and for our pleasures? Has it not been appointed by Him, the powerful as the beneficent, when it is all the result of organizations so minute and abstruse, and of chemical actions so obscure and so wonderful, that all equally eludes our faculties and confounds our reasonings? Chance, it is not; and it is not necessity: for all other animals it is purposeless: it is a source of enjoyment to us: and whence then again are the pleasures which we do enjoy, if God has not given them, if He did not thus provide for our happiness? Yes, even in things so minute and so low as this, which we must not shun to think of, from false or affected views of Him, to whom man, altogether, is as the gnat of a day's life, equally under His care and protection, lest it should lack its food and its happiness, and fail in its generations. Between Him, the infinite, and all beneath, all distances are alike: he watches indeed over the eternal welfare of man; but He also feeds the raven, and protects the sparrow. He has told us so: it is not impiety which strives to view him in everything: it is not piety nor religion that would exclude Him from any thing.

I must here notice the grape, as a special object of interest to man, and to him exclusively. How often it is alluded to in the writings of Divine origin, as being no less a gift to him than the most essential

articles of food, I need not say. But all the world has known from all times, that its familiar produce is as useful, as the instinctive desire for it is universal, under the inducement of immediate enjoyment. Like all else, indeed, it is liable to abuse, with consequent evil; but a sound philosophy can assign ample reasons for its utility; as a rational study of the constitution of the human mind, and of the conditions of the mental powers and the feelings, under the casualties of life, can no less defend and explain its moral value, independently of the mere enjoyment resulting from its use. And if the grape seems to have been peculiarly contrived for a purpose less easily attainable than otherwise, through a constitution not less remarkable than the wide diffusion of the plant and the abundance of its produce, while, further, so declaring its own uses, that man could scarcely have known it without discovering that it was ready to produce wine, it is not possible to doubt that it was appointed and destined for him to whom alone it is useful, or even acceptable; and that it really is what we have been assured, one of the especially beneficent gifts of a bountiful Creator.

If more could be necessary towards establishing the peculiar care of God for the human race in the invention of fruits, the following general fact must set the question entirely at rest. That the means of procuring enjoyment have been very generally rendered dependent on man's own industry, and on that accumulation of knowledge through his races, which is the result of successive and continuous industry, has been often shown. And when he thus produces any specific source of enjoyment, we must believe that it was designed, because the general result was intended. The laws of nature, as they are termed, have, to a certain degree, been left at his disposal: he is allowed to change the ordinary course of creation for his own profit. Had that not been permitted, or rather intended, it could not have been: and we are assured that it has, when the consequences, forming man's stimulus, are the reward of his exertions. And if, in any case, we find that latent provisions have been made for the production of what would still never have occurred but through his assistance, much more must we believe that the intention was for him, even under a double design of beneficence; since the needful exertions were essential, equally, to his physical welfare and his moral improvement.

[Abridged from MACCULLOCH's *Proofs and Illustrations of the Attributes of God.*]

THE changes which the art of the florist induces, in producing double and variegated flowers, are not to be compared with the effects of cultivation on those fruits and esculent vegetables which have been for ages under the care, and as it were the peculiar property, of man. In a wild state, indeed, they are hardly to be found at all; or *if* found, hardly recognisable. From an insignificant and acid fruit, or rather a mere berry, (for the fruit of the wild crab is nothing more,) have been produced, it is supposed, all our large and delicious varieties of apples; the colewort, a plant whose scanty leaves weigh not more than half an ounce, is said to be the original of the cabbage; the potato was but a small bitter root, growing wild in the regions of Chili. What encouragement do not these facts afford to the cultivator who seeks to reclaim other vegetables to the use and dominion of man? and if he is, as he has been said to be, a benefactor to his race, who makes two blades of grass grow in the place of one, is not he one also, who gives them a new fruit, or teaches them the use of a new plant?

IT is a pleasing task to register the actions of those men who are zealous in the pursuit of science, and who derive their chief gratification from the virtuous pleasure they afford others. They should ever be held up as models for the stimulus of future generations.—MAUND.

MACHINES FOR RAISING WATER.

II.

THE invention of the pump is so distinct in principle from any other description of machines for raising water, and so superior as an effort of science, that we must naturally conclude it was the latest invention for the purpose for which it is intended. Nothing resembling the pump has been found among any of the nations of the New World: it was unknown to the Romans, even in the rudest form, until the latter end of their empire; the ancient Egyptians were unacquainted with it, and even the Chinese have no invention resembling it. The inventor is said to be Ctesibius, a celebrated mathematician of Alexandria, about 120 years before Christ. From this invention, the principle of which was of the same nature as that of our present pump, all our modern improvements have to date their origin. Even at the present day, the pump is rarely met with in any portion of Asia.

The action of this hydraulic machine depends principally on the effects of the pressure of the atmospheric air. Suppose fig. 1 to be a tube bent up at the lower end, and more than thirty feet in length; if this tube is filled with water, and the opening at the top securely closed, although the bent end is open, a column of water will still remain in the tube, thirty-three feet in height above the level of the open mouth of the tube; but if the upper end is opened, the whole of the liquid will run out, excepting so much as will fill the bent portion of the tube, as shown by the dotted line.

Fig. 1.

There are but two sorts of pumps which essentially differ, and all the varieties we see are only modifications of these; the one is usually called a *forcing-pump*, and has a solid plunger or piston; and the second kind a *sucking-pump*, in which the piston has an opening fitted with a valve.

Fig. 2 is a section of a forcing-pump of the simplest construction. D is the reservoir of water from which the supply is drawn; the solid piston A being first forced down to the bottom of the tube in which it works air-tight, is drawn upwards, the pressure of the air on the water in the well causes it to rise in the tube, following the upward course of the piston; as soon as the piston has completed its upward stroke, it is forced downwards: this causes the valve at B to close, and prevent the return of the water, which, having no other means of escape, is forced upwards along the pipe C, and discharged at any opening that may be left for the purpose, in the course of its length: the piston is again drawn up, the valve opens, and the water follows, and is again by its downward pressure driven up the pipe C

Fig. 2.

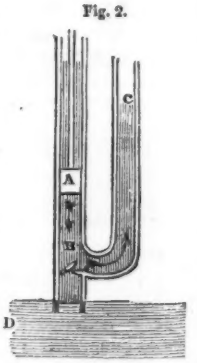


Fig. 3 shows the principle of the lifting-pump. A is the piston which is perforated and furnished with a valve, (see fig. 4,) which is a section of a common piston. A represents the hole through its substance, and B is a valve opening upwards; the water in this case must be sufficiently high to cover the piston when it is at the lower end of the tube. If the piston is now drawn up, it will carry upwards all the water that is above it, and the water from below will also

follow it, being pressed upwards by the weight of the atmosphere. On the return of the piston downwards, the water which is between it and the valve B, fig. 3, will be unable to return to the well, on account

Fig. 3.

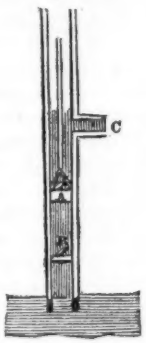


Fig. 4.

of the closing of that valve; the piston will easily move downwards through the water, the valve with which it is furnished opening upwards: thus at each stroke the water above it will have accumulated, and at each upward movement it has to lift a greater quantity, and this goes on increasing until it is above the level of the opening at C, through which it will then run.

Having thus explained the principle on which the two kinds of pumps are constructed, we shall illustrate the subject by a description of several pumps of different constructions. The following construction of the forcing-pump illustrates the principle on which the pumps attached to fire-engines are made. In fig. 5 the pump is supposed to be formed of glass, to show its internal construction. A is the solid piston moving in the cylinder of the pump, and made air-tight. B is a valve opening upwards, and placed at the end of the pipe which leads to the water in the well; the pipe C opens into the space which surrounds the upper portion of the pipe, on the top of which the valve B is placed. The water, as in the common forcing-pump, is driven along this pipe, and forced into the vessel D; a small pipe F is introduced into this vessel, and reaches to within a short distance of its bottom: as soon as the water which enters this vessel is above the level of the lower part of the pipe E, the air which D contained, which in the first instance was expelled through that pipe, will now become compressed in the upper part of the vessel, and thus act like a powerful spring, sustaining the jet of water between each stroke of the piston.

Fig. 5.

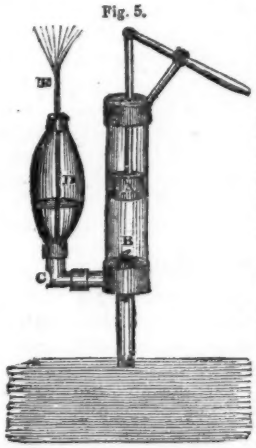
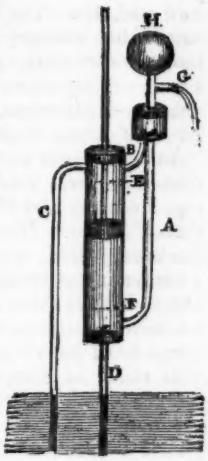


Fig. 6 represents a very ingenious pump, in which the piston acts in a double capacity, as a forcing and as a sucking piston. The four pipes, A B C D, all communicate with the large cylinder, and are each furnished at their upper extremity with a valve opening upwards; the piston of this pump is solid, and is not allowed to be raised higher than E, or depressed lower than F in the large cylinder. When the piston is forced downwards, the water with which we are to suppose the lower part of the cylinder was filled during its last ascent, is forced up the pipe A, and ultimately out at the spout G. During its last ascent it had forced the air in the upper part of the cylinder through the pipe B, and the valve at the top of this pipe falling down, would prevent its return during the descent of the piston. The consequence would be that a vacuum would be formed above the piston, and the atmospheric pressure would force the water up the pipe C into the unoccupied space. At its next return the piston would force out the water in the same manner as it did the air in the first instance, and in its next descent again produce a vacuum, thus acting at the same time as a forcing and sucking pump. When the supply of water has become sufficient to allow it to accumulate above the internal opening of the spout G, the air in the vessel H would become compressed, and act in the same manner as the condensed air noticed in the account of the last engine described.

Fig 6



ON THE EARLY MODES OF MEASURING TIME.

II.

Divisions of Time. (*Concluded.*)

Among the nations in which astronomy was first cultivated, was Chaldea, and it is natural to suppose that the first division of the day into *hours* was adopted by that people; for it would obviously be difficult to compare the times of the appearance of the heavenly bodies with so large an unit of time as five or six hours. The first division was into twelve hours, but that was afterwards replaced by a division into twenty-four hours. They began their day at sunrise, and reckoned on twenty-four hours to the next sunrise: in fact, according to our mode of naming the hours, we should say that their day commenced an hour before sunrise, because the hour of sunrise was reckoned one. It is probable, however, that, instead of employing the numbers to denote the divisions between these twenty-four periods, they applied them to the periods themselves, calling them "the first hour," "the second hour," and so on: in this sense, the notation would begin and end at the moment of sunrise.

The Egyptians computed their hours in a manner somewhat similar to our own; that is, they began the day at midnight; but here the similarity ends, for, instead of reckoning twice twelve hours, they went through the whole twenty-four, like the Chaldeans and Babylonians. The first mention of *hours* in the Bible occurs in Daniel iii. 6; and v. 5: in these cases, however, the word *time* or *moment* would convey the same meaning as the word *hour*; but, as the Jews obtained their notions of the division of the day into hours from the Chaldeans, when they were carried into captivity to Babylon, and as Daniel lived at that period, B.C. 570, it is probable that the sentences just alluded to really related to *hours*.

The Jews, however, deviated from the plan adopted by their instructors, inasmuch as they began their day at sunset, instead of sunrise, and reckoned two series of twelve hours each, instead of one series of twenty-four hours. These two series extended, one from sunset to sunrise, and the other from sunrise to sunset; and, as each period was divided into twelve

equal parts, it necessarily followed that the night-hours were longer than the day-hours in Winter, and shorter in Summer, in consequence of the difference in the hour of sunrise: the word *hour*, therefore, had not the same definite meaning with them as it has now with us. The night was divided by the Jews, before their country became subject to the Romans, into *three* watches,—called in Latin "Vigiliæ,"—consisting of four night-hours each. These Vigiliæ were afterwards increased, under the Romans, to *four*, viz., *Even, Midnight, Cock-crowing*, and *Morning*.

In the Earlier ages of Greece, it does not appear that hours were known; for Homer speaks of Morning, Evening, and Midday, in a manner analogous to that of David. Hippocrates is said to have brought the horary division of the day into practice in Greece, from having observed it in Egypt. There seems reason to believe that many of those nations which had no communication with the Chaldeans, reckoned the progress of time by *Nights*; for Tacitus speaks of that mode of computation, as having been in vogue among the ancient Germans. The same remark was made by Cæsar, with respect to the ancient Gauls; and it is known at the present day that some of the nations of central and southern Africa, the Mashoos, for example, reckon time by the lapse of nights. Indeed our own household words, "se'nnight" and "fortnight," seem to be surviving proofs that a practice somewhat similar was once prevalent in Britain.

Confusion is sometimes created by applying the term "day" both to the whole twenty-four hours, and to that portion of them during which the sun is above the horizon; it has therefore been proposed to use the word "Nycthemeron" for the former,—thereby confining the term *day* to the latter. *Nycthemeron* implies *day and night* together.

The origin of the names of the days of the week is a curious sample of the influence which Astrology exerted over the minds of the "ruling powers" of those days. The seven primary planets (for *then* they were *all* called planets) Saturn, Jupiter, Mars, Sun, Venus, Mercury, and the Moon, were believed to take it in turn to preside over the affairs of the world, each one ruling for one hour, and then giving way to the next. The day was named after the planet who happened to be in the ascendant at the first hour of that day. Thus Saturn was said to be the ruling planet at the first hour of the Jewish sabbath; the sabbath was therefore named, after him, *Dies Saturni*, or the day of Saturn. The eighth, fifteenth, and twenty-second hours of that day, would likewise come under the dominion of Saturn; the twenty-third under Jupiter, the twenty-fourth under Mars, and the first hour of the following day under the Sun,—from which arose Sun-day, or *Dies Solis*. Proceeding in a similar manner, we find that the seven days, reckoning from Saturday, came in the following order:—Saturn's day, Sun's day, Moon's day, Mars' day, Mercury's day, Jupiter's day, and Venus' day; and from these titles the Latin names of the week were derived. The English names are well known to be derived from those of some old Saxon idols.

In many uncivilized countries at the present day, the computation of time by *moons*, or months, is adopted. But this only relates to large portions of time; for smaller portions may obviously be more conveniently computed by the arrival of the sun at the meridian, or the natural day.

The Jewish month was lunar, and calculated from the first appearance of the moon, on which the "feast of the New Moon" was celebrated. This was the beginning of the month. It was proclaimed *by* the sound of trumpets, and many additional sacrifices were offered:—hence the Psalmist says, "Blow up the trumpets in the new-moon, in the time appointed, on our solemn feast day." Psalm LXXXI. 3.

There is no particular reason why a division of the day into twenty-four hours should be preferred to any other: twenty or thirty-six, for instance, would be quite as well; but twenty-four having been chosen, other nations gradually adopted the same number, although they may vary in their modes of computing those hours. It was, however, obviously necessary to devise the means for measuring them equally. Varied both in principle and in details, have been the means invented for this purpose. The sun-dial, the clepsydra, or water-clock, the hour-glass, and wheel-clocks and watches, have been the chief contrivances: in some countries burning candles or torches have been employed for this purpose. Thus, in the age of our Alfred the Great, time was measured by the burning of candles:—and again, Beckmann, on the authority of an Arabian traveller, cited by Renaudot, states that in China, in the ninth century, a person appointed for the purpose, used to strike a board suspended from a string, as a signal of the lapse of each successive hour. Thunberg says that in Japan they burn matches made of plaited rope, with knots tied on it at certain intervals. When the match burns to a knot, a watchman strikes a given number of blows on a bell, in one of the temples by day, and goes about at night and strikes two boards together a certain number of times, to indicate the hour of the night: but how the hours were computed in the first instance, we are not informed.

Before we proceed to describe the three time-measuring instruments, universally used before clocks and watches, we will say a few words respecting an ancient building which seems to have been intended expressly for a *horologium*, or general indicator of time. This is the tower of Cyrrhestes Andronicus, an astronomer of Athens, which is known in the present day as the "Tower of the Winds." It is described by Vitruvius, an architect in the reign of Augustus Cæsar, who has left a work on architecture; and from a most minute examination of it by Messrs. Stuart and Revett, some years ago, it is evident that the greater part of it answers the description given by Vitruvius.

It is an octagonal tower of marble, originally about fifty feet high, which was surmounted by a brazen Triton, (no longer to be seen,) holding a wand in his right hand. This Triton acted as a weathercock, and turned on an axis by the moving power of the wind; pointing with his wand to the quarter whence the wind blew. To indicate what part of the compass that might be, a figure was sculptured in bas-relief, on a frieze, on each of the eight sides of the tower; which figure was emblematical of the kind of weather which generally prevailed during the continuance of that wind at Athens. The eight winds, and their emblematical representatives, were as follow:—

SOUTH, usually sultry and wet:—A young man emptying a jar of water.

NORTH, cold and stormy:—An old man warmly clad, and holding a conch, the mimic roar of which is often similar to that of a howling wind.

EAST, gentle, fruitful rain:—A young man with fruit and honey.

N. EAST, cloudy, wet, and cold:—An old man with a kind of shield.

S. EAST, sultry and gloomy:—An old man in gloomy vestments.

S. WEST, blows from sea:—A robust man bearing part of a ship from the sea; it being an unfavourable time for sailing from the Athenian port.

West, warm and fruitful:—A young man lightly clad.
N. West, drying and blighting winds:—A young man, with a brasen fire-pot, strewing ashes and coals.

The names of the winds are written in Greek over the bas-reliefs; but the accompanying explanations are given by modern writers, the real meaning of some of the figures being matter of conjecture.

Under these bas-reliefs are eight sun-dials, all vertical in position, but different in their construction, according to the side on which they are placed. Delambre, the eminent French mathematician, has determined the construction of these dials to be rigorously correct, and to evince a complete knowledge of the principles of construction.

In the pavement of this tower have been observed channels cut, as if for the flow of water; and it has been conjectured, with much probability, that these channels were either for the supply of water to a clepsydra, or for carrying off the water from one: the clepsydra being for the indication of time at those hours and seasons, when the sun-dials were not available. Thus, this tower was in various ways available for showing the points of the compass, the direction of the wind, the hour of the day, (and most probably the seasons of the year,) by sun-dials, as likewise the hour by a clepsydra. It is all strongly indicative of the ingenuity of the ancient Athenians.

Its use at the present day is mournfully different from that of which we have just been speaking. The editor of the splendid work on Athens, by Stuart and Revett, to which we are indebted for these latter details, says, "This tower is now a Turkish chapel, called Teckeh, in which the Dervishes perform a religious ceremony. The Dance of the Dervishes, the offspring of a humiliating superstition, has been assimilated to the dances of the Corybantes, and the Salü. Osmanlees of all classes occasionally join in it, with the Mewlemi Dervishes. They pretend that during the stupor produced by its revolution, they enjoy an abstraction in the contemplation of the Divinity not always otherwise possessed. It is commenced by the officiators sitting on the ground in a circle, who to the sound of drums and ruder tambours, begin to groan and yell the words, "Alla! La illa ill Alla,"—"God! there is no other God but God." At the same time rocking their bodies to the time of the harsh discord. Soon they rise, and hand in hand commence their frantic dance: the howls increase, when suddenly one, as if possessed, breaks from the rest, and, with extended arms, begins to revolve with a sickening celerity, and is soon followed by his comrades. The horrid din increases, till at length the performers are compelled by exhaustion to relinquish their religious pastime, leaving on the minds of the astonished Frank spectators the impression of one of the most abject forms of artificial human degradation." Stuart's *and* Revett's *Athens*.

Having thus briefly alluded to the circumstances which led to the division of the day into hours, we shall continue the subject by treating separately of the Sun-dial, the Clepsydra, and the Hour-glass.

THE FOREST TREE.

Dropped by the squirrel or the bird,
Perchance the nut, from whence its birth,
Was by the rabbit's foot interred
Within the soft, moist forest earth.
Urged by its secret principle,
It burst from out its perished shell,
To seek the light and air;
And by the nibbling fawn unseen,
Its downy twin-leaved stem grew green,
And rose a sapling there.

Its roots stretched out, its branches spread,
Thickened its trunk, until on high,
Covered with leaves, its lofty head
Made fret-work of its spot of sky.
A wand the robin bent, now stood
The giant monarch of the wood,
Where stooped the eagle's flight;
Once trembling at the slightest breath,
It now scarce deigned to stir beneath
The tempest's fiercest might.

The deer amid its cool green gloom,
Sought refuge from the noon-tide heat,
And sounding in its leafy dome,
The thresher's warbled notes were sweet.
The sunbeams scarce could find their way
Through its thick screen, their spots to lay
Upon the roots below,
That wreathed deep, mossy nooks, where led
The quail her brood, when winter spread
His chilling robes of snow.

And nature's jewels, radiant things,
Loved the green sylvan place; the bee
Turning to harps its quivering wings,
With arrowy straightness sought the tree.
Floated the yellow butterfly,
A wandering dot of sunshine, by,
And nestling 'mid its moss,
The sky-tinged violet's fairy cup
Its draught of fragrance offered up
To airs that stole across.

Its branches formed the panther's lair,
When waiting for his deadly leap
And in its hollowed trunk the bear
Coiled his black form in torpid sleep.
Ages of Springs renewed its crown,
Ages of Autumns cast it down,
Till heaps on heaps were strown;
Lichens crept up its furrowed side,
Its very race of eagles died,
But still it flourished on.

But its time came: its figure dropped,
Leaves came no more in vernal days,
And threads of pale green moss were looped
Around its dry and shrunken sprays.
It stood a spectre, gaunt and bare,
Reaching a shrivelled arm in air,
To court the lightning's dart,
Until the tempest stooped, and cast
Its red sulphureous bolt at last,
And scorched it to the heart.

Then as the gust came whirling round,
It shook from root to pinnacle,
And headlong to the echoing ground,
It hurtling, crashing, thundering fell!
Melting away, the fractured trunk
To a green moss-mound slowly sunk,
Until the soil crept o'er,
And, by its solemn mystery,
Took to itself the stately tree,
Which once it proudly bore.

Alfred B. Street.

THE BUSTARD, (*Otis tardus.*)

The Bustard is one of those birds which appear, in Europe, to supply the place occupied by the ostrich and its congeners in Asia, Africa, and South America. It belongs to the tribe of *running birds*. All the species of the bustard are heavy birds, and usually slow in their flight; but they can run on the ground with great swiftness, and they are never known to perch. The male of the common bustard, of which we are about to speak, is about three feet in length from the tip of the beak to the tail, and the dimensions of the female are one-third less.

The male bustard is one of our largest land birds, and Nature has provided it with a very curious appendage, the use of which is uncertain. This singular apparatus is a kind of bag or pocket, which is placed beneath the skin at the upper part of the

neck. The opening to this curious reservoir is under the tongue, and it is large enough to hold several pints of water; as the bird frequents dry and sandy plains where water is not to be met with, it is probable that this contrivance is intended to supply him with that wholesome liquid. According to Bewick, the water is also applied to another purpose; namely, to defend its owner against the attacks of birds of prey, over whom he ejects it with great violence. Montague, on the other hand, considers it intended to supply the female with water when sitting, and the young, after they are excluded from the egg; the female is unprovided with this water-bag. Bustards are found in some parts of France, in Italy, Germany, and, although very rarely at present, in England.

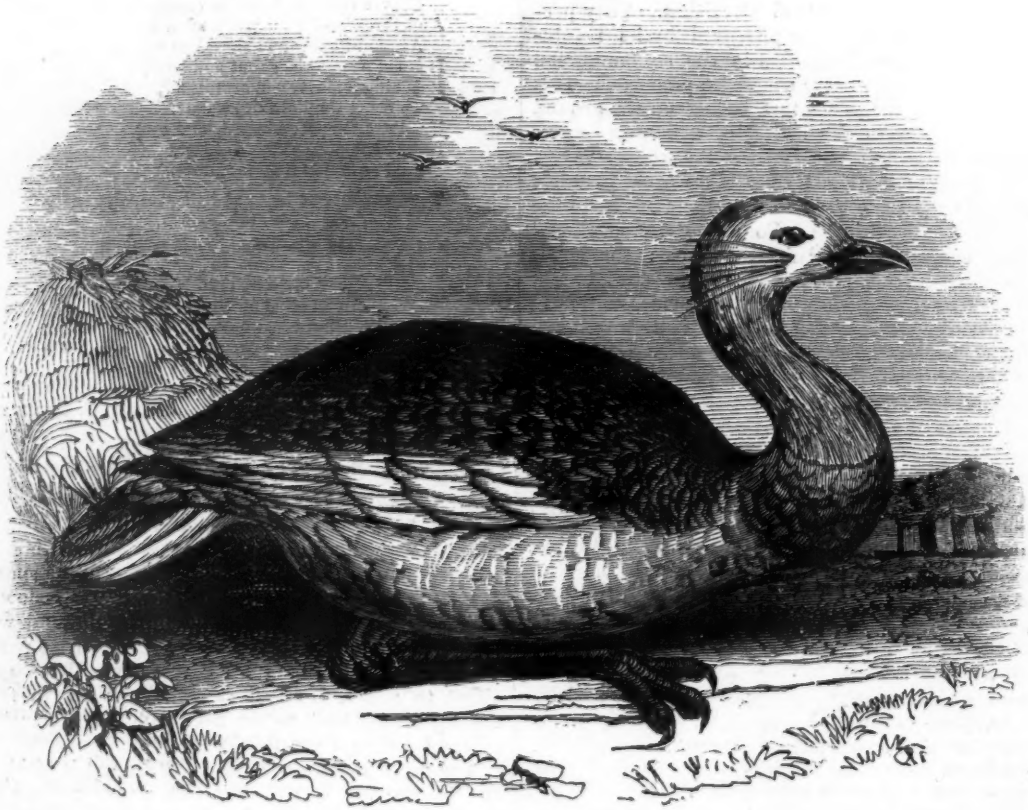
The food of the bustard appears to be usually different kinds of grain, but they also devour greedily mice, frogs, and lizards; and if we may believe a French author, they are as fond of pieces of metal as the ostrich. They lay their eggs in the month of May in a hole in the earth, generally in a field of corn. The number of eggs is believed to be usually two or three, and the time occupied in hatching them is about thirty days; they are about the size of those of a goose, of an olive-brown, with spots of the same colour, but darker. It is said that the female will desert her eggs if they are touched. The young, when they leave the egg, are covered with a white down. In some parts of the Continent the young are sometimes taken alive, and kept in confinement. They are then fed, in the first instance, with rye bread, mixed up with the yolk of an egg, afterwards with rye bread chopped up with bullocks' liver.

The bustard is now so little known in this country, that it may almost be considered as extinct. It is sometimes found, though very rarely, on Salisbury Plain, and on the coast of Norfolk. According to the French *Dictionnaire des Sciences Naturelles*, the bustards, which are considered to be birds of passage,—

> Arrive about the beginning of December, and remain only until the month of March, when they have to proceed further north; assembling in small groups, and sometimes in large companies, amounting even to thirty or forty; they betake themselves to the vast plains of Champagne, Poitou, &c.: but during severe winters, and when snow is abundant, they are generally distributed over the country, and keep more to the south. They prefer those spots which are remote from any habitation, and sufficiently elevated to enable them to discover the approach of danger when at some distance. They are usually hunted with dogs and horses, and the best time is supposed to be during a frost.

Before they are able to fly, they are obliged to run a considerable distance with the wings extended. As there is considerable difficulty in getting near them, several stratagems have been resorted to, to obtain that end, such as approaching them disguised in the skin of a cow, or under a moving covering of wood resembling a shepherd's hut. One circumstance in favour of discovering these birds is their habit of seldom wandering far from their usual place of resort.

The bustards, particularly the young, are highly prized as an article of food, and their feathers like those of the goose and swan, are used for pens. Some attempts have been made to domesticate the bustard, but the small number of their eggs seems to have rendered the task unprofitable. Pallas says, in his Travels to the South of Russia, that "the domesticated bustards in the Crimea have never laid;" and Montague, in the supplement to his *Ornithological Dictionary*, says that "they never could be kept alive in confinement more than two or three years."



THE BUSTARD.

LONDON: Published by JOHN WILLIAM PARKER, WEST STRAND; and sold by all Booksellers.